

IN THE CLAIMS

Please amend claims 1, 3, 5-9, 13 and 18 as follows:

1           1. (Currently Amended) A method of compressing a video or  
2 image, comprising the steps of:  
3           defining a configuration space that models an optimal bit  
4 allocation problem of a data compression process, the configuration  
5 space defining nodes and transitions between the nodes, the nodes  
6 corresponding to ~~the~~ a selection of respective quantizers for  
7 respective features of a data stream, a path defined by a set of  
8 transitions each connected at respective ones of said nodes to  
9 another one of said set of transitions, said path joining a start  
10 node and an end node and having a total cost corresponding to a sum  
11 of costs of said transitions of said set of transitions;  
12           propagating least-cost waves through said configuration space  
13 by budding, responsively to a space-variant metric, such that a  
14 first path of lowest found cost is identified through said  
15 configuration space joining said start node and said end node; and

16           applying the quantizers corresponding to said nodes lying on  
17   said first path to a first set of data to be compressed by said  
18   data compression process.

1           2. (Original) A method as in claim 1, further comprising the  
2   step of repeating said step of propagating such that a second path  
3   of lowest found cost is identified and repeating said step of  
4   applying in compressing a second set of data to be compressed by  
5   said data compression process.

1           3. (Currently Amended) A method of compressing a video or  
2   image, comprising the steps of:  
3           defining a configuration space that models an optimal bit  
4   allocation problem of a data compression process, the configuration  
5   space defining nodes and transitions between the nodes, the nodes  
6   corresponding to ~~the~~ a selection of respective quantizers for  
7   respective features of a data stream, a path defined by a set of  
8   transitions each connected at respective ones of said nodes to  
9   another one of said set of transitions, said path joining a start  
10   node and an end node and having a total cost corresponding to a sum  
11   of costs of said transitions of said set of transitions;

12        propagating least-cost waves through said configuration space  
13        by budding, responsively to a space-variant metric, such that a  
14        first path of lowest found cost is identified through said  
15        configuration space joining said start node and said end node;  
16        repeating said step of propagating such that a second path of  
17        lowest found cost is identified; and  
18        comparing said lowest found costs of ~~said the~~ first and second  
19        path and applying the quantizers corresponding to said nodes lying  
20        on a lower cost one of said first and second paths in compressing  
21        input data to be compressed by said data compression process.

1        4.(Original) A method as in claim 3, wherein said steps of  
2        repeating and comparing are performed conditionally based upon an  
3        allowed time interval for finding an optimal least cost path.

1        5.(Currently Amended) A method as in claim 3, wherein said  
2        input ~~video~~-data includes video data and said cost is one of a  
3        distortion of images of said video data and a bit rate of a data  
4        stream resulting from said step of applying.

1        6.(Currently Amended) A data compression device, comprising:

2        a processor connected to receive a raw data stream and output  
3        a compressed data stream;

4        said processor being programmed to determine optimal  
5        quantizers by budding nodes of a configuration space that models an  
6        optimal bit allocation problem of a data compression process, the  
7        nodes corresponding to ~~the~~ a selection of respective quantizers for  
8        respective features of a data stream, a path defined by a set of  
9        transitions each connected at respective ones of said nodes to  
10       another one of said set of transitions, said path joining a start  
11       node and an end node and having a total cost corresponding to a sum  
12       of costs of said transitions of said set of transitions;

13       said budding including propagating least-cost waves through  
14       said configuration space responsively to a space-variant metric  
15       such that a path of lowest found cost is identified through said  
16       configuration space joining said start node and said end node;

17       said processor being programmed to apply the quantizers  
18       corresponding to said nodes lying on said path of lowest found cost  
19       in compressing said raw data.

1       7. (Currently Amended) A data compression device, comprising:

2           a processor connected to receive a raw data stream and output  
3   a compressed data stream;  
4           said processor being programmed to determine optimal  
5   quantizers by budding nodes of a configuration space that models an  
6   optimal bit allocation problem of a data compression process, the  
7   nodes corresponding to ~~the~~ a selection of respective quantizers for  
8   respective features of a data stream, a path defined by a set of  
9   transitions each connected at respective ones of said nodes to  
10   another one of said set of transitions, said path joining a start  
11   node and an end node and having a total cost corresponding to a sum  
12   of costs of said transitions of said set of transitions;  
13           said budding including propagating least-cost waves through  
14   said configuration space responsively to a space-variant metric  
15   such that a first path of lowest found cost is identified through  
16   said configuration space joining said start node and said end node;  
17           said processor being programmed to further propagate further  
18   cost waves to identify a second path of lowest found cost and to  
19   compare said lowest found costs of ~~said~~ the first and second path  
20   and apply the quantizers corresponding to said nodes lying on a  
21   lower cost one of said first and second paths in compressing said  
22   raw data.

1           8. (Currently Amended) A method of allocating bits for optimal  
2 rate/distortion performance in digital data compression,  
3 comprising:

4           determining a set of interconnected choices of quantizers for  
5 each of a set of portions of a data stream in accord with said  
6 digital data compression;

7           defining a starting one of said set of interconnected choices  
8 and propagating least-cost waves beginning with said starting one  
9 of said set of interconnected choices until a path defining all  
10 necessary quantizers is found; and

11           implementing a data compression based upon at least some of  
12 ~~said the~~ quantizer choices defined by said path.

1           9. (Currently Amended) A method as in claim 8, wherein said  
2 step of determining includes determining a set of interconnected  
3 choices of quantizers for each of a set of portions of a video data  
4 stream.

1           10. (Original) A method as in claim 9, wherein said quantizers  
2 include a quadtree decomposition of a video image.

1        11.(Original) A method as in claim 9, wherein said quantizers  
2 include a quantizer for representing a motion vector field.

1        12.(Original) A method as in claim 8, wherein said quantizers  
2 include a quantizer for quantizing differences between values in  
3 said data stream.

1        13.(Currently Amended) A device for allocating bits for  
2 optimal rate/distortion performance in digital data compression,  
3 comprising:

4        a processor linked to a data stream and programmed to  
5 determine a set of interconnected choices of quantizers for each of  
6 a set of portions of a data stream in accord with said digital data  
7 compression;

8        said processor being further programmed to define a starting  
9 one of said set of interconnected choices and to propagate least-  
10 cost waves beginning with said starting one of said set of  
11 interconnected choices until a path defining all necessary  
12 quantizers is found; and

13        said processor being further programmed to implement a data  
14        compression process based upon at least some of ~~said~~ the quantizer  
15        choices defined by said path.

1        14.(Original) A device as in claim 13, wherein said data  
2        stream is a video data stream.

1        15.(Original) A device as in claim 14, wherein said  
2        quantizers include a quadtree decomposition of a video image.

1        16.(Original) A device as in claim 14, wherein said  
2        quantizers include a quantizer for representing a motion vector  
3        field.

1        17.(Original) A device as in claim 13, wherein said  
2        quantizers include a quantizer for quantizing differences between  
3        values in said data stream.

1        18.(Currently Amended) A device for allocating bits for  
2        optimal rate/distortion performance in digital data compression,  
3        comprising:



4           a processor linked to a data stream and programmed to  
5     determine a set of interconnected choices of quantizers for each of  
6     a set of portions of a data stream in accord with said digital data  
7     compression;

8           said processor being further programmed to define a starting  
9     one of said set of interconnected choices and to propagate least-  
10    cost waves beginning with said starting one of said set of  
11    interconnected choices until a first path defining all necessary  
12    quantizers is found;

13          said processor being further programmed to propagate least-  
14    cost waves beginning with a lowest cost incomplete path until a  
15    second path defining all necessary quantizers is found;

16          said processor being further programmed to implement a data  
17    compression process based upon at least some of ~~said~~ the quantizer  
18    choices defined by a lowest cost one of ~~said~~ the first and second  
19    paths.

1           19.(Original) A device as in claim 18, wherein said data  
2    stream is a video data stream.

1        20.(Original) A device as in claim 19, wherein said  
2        quantizers include a quadtree decomposition of a video image.

1        21.(Original) A device as in claim 19, wherein said  
2        quantizers include a quantizer for representing a motion vector  
3        field.

1        22.(Original) A device as in claim 18, wherein said  
2        quantizers include a quantizer for quantizing differences between  
3        values in said data stream.